Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M Tech**
GEPE209

2nd SEMESTER BACK EXAMINATION – 2016-17
FUNDAMENTALS OF SOIL BEHAVIOUR
BRANCH(S): GEOTECHNICAL ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE:Z1079
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Assume Suitable Data Wherever Necessary

Q1 **Answer the following questions:** **(2 x 10)**

a) Distinguish between collapsible soil and laterite from an engineering point of view.
b) Distinguish between sand, silt and clay.
c) What do you mean by dilatancy of soil?
d) How would you distinguish a material whether it is OL, OI or OH?
e) Define virgin curve. What is its significance?
f) What is thixotropy of clay?
g) Differentiate between texture and structure of soil.
h) Sketch the stress-strain relationship for dense and loose sand.
i) What is a collapsible soil? Give a few examples.
j) What is ground freezing? What are its ill effects?

Q2 Relate different formations of soils to the geological aspects. Bring out the typical characteristics of the following materials: peat, organic soil loess, bentonite shale, and montmorillonite. How do knowledge on this subject help in soil engineering practice? **(10)**

Q3 Why is classification of soil required? Describe the field identification tests to distinguish between clay and silt. **(10)**

Q4 State the purpose of identification and classification of soils. List any three important engineering soil classification systems and describe one in detail, clearly bringing out its limitations **(10)**

Q5 **a)** What are various parameters that affect the permeability of soil in the field? Critically discuss. Estimate the coefficient of permeability for a uniform sand with D_{10} = 0.22 mm. **(5)**

b) Why is the permeability of clay soil with flocculated structure greater than that for it in the remoulded state? Critically discuss. Why is capillary rise greater for fine grained soils than for coarse grained soils? **(5)**

Q6 **a)** Explain why is it necessary to double the load in a consolidation test. A 30 mm thick oedometer sample of clay reached 25% consolidation in 15 minutes with drainage at top and bottom. How long would it take the clay layer from which this sample was obtained to reach 70% consolidation? The clay layer had one-way drainage and was 10 m thick. **(5)**

b) Differentiate between shear strength parameters obtained from total and effective stress considerations. **(5)**

Q7 **a)** A one story wood-frame house is to be built on a site in Paradeep that is underlain by clay with a plasticity index of 40. Is this house prone to distress due to expansive soils? Why or why not? The total anticipated settlement due to consolidation of a clay layer under a certain pressure is 150 mm. If 45 mm of settlement has occurred in 9 months, what is the expected settlement in 18 months? **(5)**

b) Discuss the causes and types of damages and cracks in buildings on expansive soils. **(5)**

Q8 **Write Short Notes on any Five:** **(5 x 2)**

a) Pre-consolidation pressure
b) Marl and caliche
c) Mohr-Coloumb strength envelope
d) Liquidity index
e) Compression index
f) SF soil
g) Pore pressure ratio